

# ATV930C16N4C

variable speed drive - ATV930 - 160kW - 400/480V -  
w/o braking unit - IP00



## Main

|                                    |   |
|------------------------------------|---|
| Range of product                   | Altivar Process ATV900  |
| Product or component type          | Variable speed drive  |
| Device application                 | Industrial application  |
| Device short name                  | ATV930  |
| Variant                            | Standard version<br>Without braking chopper   |
| Product destination                | Asynchronous motors<br>Synchronous motors   |
| Mounting mode                      | Wall mount  |
| EMC filter                         | Integrated conforming to EN/IEC 61800-3 category C3 with 150 m motor cable maxi   |
| IP degree of protection            | IP00 conforming to IEC 60529<br>IP00 conforming to IEC 61800-5-1<br>IP21 conforming to IEC 61800-5-1 with kit VW3A9704<br>IP21 conforming to IEC 60529 with kit VW3A9704                                    |
| Type of cooling                    | Forced convection   |
| Supply frequency                   | 50...60 Hz (+/- 5 %)  |
| Network number of phases           | 3 phases  |
| [Us] rated supply voltage          | 380...480 V (- 15...10 %)   |
| Motor power kW                     | 160 kW (normal duty)<br>132 kW (heavy duty)   |
| Motor power hp                     | 250 hp (normal duty)<br>200 hp (heavy duty)   |
| Line current                       | 284 A at 380 V (normal duty)<br>262 A at 480 V (normal duty)<br>237 A at 380 V (heavy duty)<br>213 A at 480 V (heavy duty)  |
| Prospective line I <sub>sc</sub>   | 50 kA   |
| Apparent power                     | 201.3 kVA at 480 V (normal duty)<br>161.4 kVA at 480 V (heavy duty)   |
| Continuous output current          | 302 A at 2.5 kHz (normal duty)<br>240 A at 2.5 kHz (heavy duty)   |
| Maximum transient current          | 375 A during 60 s (heavy duty)<br>362 A during 60 s (normal duty)   |
| Asynchronous motor control profile | Constant torque standard<br>Variable torque standard<br>Optimized torque mode   |
| Synchronous motor control profile  | Permanent magnet motor  |
| Speed drive output frequency       | 0.1...599 Hz  |
| Nominal switching frequency        | 2.5 kHz   |
| Switching frequency                | 2.5...8 kHz with derating factor<br>1...8 kHz adjustable  |
| Safety function                    | STO (safe torque off) SIL 3   |
| Discrete input logic               | 16 preset speeds  |
| Communication port protocol        | Ethernet/IP<br>Modbus serial<br>Modbus TCP  |
| Option card                        | Slot A : communication module for Profibus DP V1<br>Slot A : communication module for Profinet<br>Slot A : communication module for DeviceNet<br>Slot A : communication module for CANopen daisy chain RJ45 |

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Slot A : communication module for CANopen SUB-D 9  
 Slot A : communication module for CANopen screw terminals  
 Slot A : communication module for EtherCAT  
 Slot A/slot B/slot C : digital and analog I/O extension module  
 Slot A/slot B/slot C : output relay extension module  
 Slot B : 5/12 V digital encoder interface module  
 Slot B : analog encoder interface module  
 Slot B : resolver encoder interface module

## Complementary

|                                     |  |
|-------------------------------------|--|
| Output voltage                      | <= power supply voltage  |
| Motor slip compensation             | Adjustable<br>Automatic whatever the load<br>Can be suppressed<br>Not available in permanent magnet motor law  |
| Acceleration and deceleration ramps | Linear adjustable separately from 0.01...9999 s  |
| Braking to standstill               | By DC injection  |
| Protection type                     | Motor : thermal protection<br>Motor : safe torque off<br>Motor : motor phase break<br>Drive : thermal protection<br>Drive : safe torque off<br>Drive : overheating<br>Drive : overcurrent between output phases and earth<br>Drive : overload of output voltage<br>Drive : short-circuit protection<br>Drive : motor phase break<br>Drive : overvoltages on the DC bus<br>Drive : line supply overvoltage<br>Drive : line supply undervoltage<br>Drive : line supply phase loss<br>Drive : overspeed<br>Drive : break on the control circuit |
| Frequency resolution                | Display unit : 0.1 Hz<br>Analog input : 0.012/50 Hz  |
| Electrical connection               | Control, screw terminal : 0.5...1.5 mm <sup>2</sup> (AWG 20...AWG 16)<br>Motor, screw terminal : 2 x 95...3 x 120 mm <sup>2</sup> (AWG 3/0...300 kcmil)<br>Line side, screw terminal : 2 x 95...3 x 120 mm <sup>2</sup> (AWG 3/0...300 kcmil)<br>DC bus, screw terminal : 2 x 95...3 x 120 mm <sup>2</sup> (AWG 3/0...300 kcmil)   |
| Connector type                      | 2 RJ45 (on the control block) for Ethernet IP/Modbus TCP<br>1 RJ45 (on the control block) for Modbus serial  |
| Physical interface                  | 2-wire RS 485 for Modbus serial  |
| Transmission frame                  | RTU for Modbus serial  |
| Transmission rate                   | 10/100 Mbit/s for Ethernet IP/Modbus TCP<br>4.8, 9.6, 19.2, 38.4 kbit/s for Modbus serial  |
| Exchange mode                       | Half duplex, full duplex, autonegotiation for Ethernet IP/Modbus TCP   |
| Data format                         | 8 bits, configurable odd, even or no parity for Modbus serial  |
| Type of polarization                | No impedance for Modbus serial   |
| Number of addresses                 | 1...247 for Modbus serial  |
| Method of access                    | Slave for Modbus TCP   |
| Supply                              | External supply for digital inputs : 24 V DC (19...30 V) current <= 1.25 mA (overload and short-circuit protection)<br>Internal supply for reference potentiometer (1 to 10 kOhm) : 10.5 V DC +/- 5 % current <= 10 mA (overload and short-circuit protection)<br>Internal supply for digital inputs and STO : 24 V DC (21...27 V) current <= 200 mA (overload and short-circuit protection)   |
| Local signalling                    | 3 mono/dual colour LED for local diagnostic<br>5 dual colour LED for embedded communication status<br>2 dual colour LED for communication module status<br>1 red LED for presence of voltage   |
| Width                               | 320 mm   |
| Height                              | 852 mm   |
| Depth                               | 393 mm   |
| Product weight                      | 82 kg  |
| Analogue input number               | 3  |

|                           |  |
|---------------------------|--|
| Analogue input type       | Software-configurable voltage AI1, AI2, AI3 : 0...10 V DC impedance 30 kOhm, resolution 12 bits<br>Software-configurable current AI1, AI2, AI3 : 0...20 mA/4...20 mA impedance 250 Ohm, resolution 12 bits   |
| Discrete input number     | 10   |
| Discrete input type       | Programmable DI1...DI8 : 24 V DC ( $\leq 30$ V) impedance 3.5 kOhm<br>Programmable as pulse input DI7, DI8 0...30 kHz : 24 V DC ( $\leq 30$ V)<br>Safe torque off STOA, STOB : 24 V DC ( $\leq 30$ V) impedance $> 2.2$ kOhm   |
| Input compatibility       | Discrete input STOA, STOB : level 1 PLC conforming to EN/IEC 61131-2<br>Discrete input DI1...DI8 : level 1 PLC conforming to EN/IEC 61131-2<br>Pulse input DI7, DI8 : level 1 PLC conforming to IEC 65A-68   |
| Discrete input logic      | DI1...DI8, DI1...DI8 positive logic (source) : $< 5$ V (state 0) $> 11$ V (state 1)<br>DI1...DI8, DI1...DI8 negative logic (sink) : $> 16$ V (state 0) $< 10$ V (state 1)<br>DI7, DI8, DI7, DI8 positive logic (source) : $< 0.6$ V (state 0) $> 2.5$ V (state 1)<br>STOA, STOB, STOA, STOB positive logic (source) : $< 5$ V (state 0) $> 11$ V (state 1)   |
| Analogue output number    | 2  |
| Analogue output type      | Software-configurable voltage AQ1, AQ2, AQ1, AQ2 : 0...10 V DC impedance 470 Ohm, resolution 10 bits<br>Software-configurable current AQ1, AQ2, AQ1, AQ2 : 0...20 mA impedance 500 Ohm, resolution 10 bits   |
| Discrete output number    | 2  |
| Discrete output type      | Logic output DQ+ : 0...1 kHz ( $\leq 30$ V) DC, $< 100$ mA<br>Programmable as pulse output DQ+ : 0...30 kHz ( $\leq 30$ V) DC, $< 20$ mA<br>Logic output DQ- : 0...1 kHz ( $\leq 30$ V) DC, $< 100$ mA   |
| Sampling duration         | Discrete input DI1...DI8 : 2 ms (+/- 0.5 ms)<br>Pulse input DI7, DI8 : 5 ms (+/- 1 ms)<br>Analog input AI1, AI2, AI3 : 1 ms (+/- 1 ms)<br>Analog output AQ1, AQ2 : 5 ms (+/- 1 ms)   |
| Accuracy                  | Analog input AI1, AI2, AI3 : +/- 0.6 % for a temperature variation 60 °C<br>Analog output AQ1, AQ2 : +/- 1 % for a temperature variation 60 °C   |
| Linearity error           | Analog input AI1, AI2, AI3 : +/- 0.15 % of maximum value<br>Analog output AQ1, AQ2 : +/- 0.2 %   |
| Maximum switching current | Relay output R1 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 250 V AC<br>Relay output R1 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 30 V DC<br>Relay output R2, R3 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 250 V AC<br>Relay output R2, R3 on inductive load ( $\cos \phi = 0.4$ and $L/R = 7$ ms) : 2 A at 30 V DC<br>Relay output R1 on resistive load ( $\cos \phi = 1$ ) : 3 A at 250 V AC<br>Relay output R1 on resistive load ( $\cos \phi = 1$ ) : 3 A at 30 V DC<br>Relay output R2, R3 on resistive load ( $\cos \phi = 1$ ) : 5 A at 250 V AC<br>Relay output R2, R3 on resistive load ( $\cos \phi = 1$ ) : 5 A at 30 V DC |
| Relay output number       | 3  |
| Relay output type         | Configurable relay logic R1 : fault relay NO/NC electrical durability 100000 cycles<br>Configurable relay logic R2 : sequence relay NO electrical durability 1000000 cycles<br>Configurable relay logic R3 : sequence relay NO electrical durability 1000000 cycles  |
| Refresh time              | Relay output R1, R2, R3 : 5 ms (+/- 0.5 ms)  |
| Minimum switching current | Relay output R1, R2, R3 : 5 mA at 24 V DC  |
| Isolation                 | Between power and control terminals  |
| Specific application      | Process  |
| IP degree of protection   | IP21   |

## Environment

|                               |   |
|-------------------------------|---|
| insulation resistance         | $> 1$ mOhm at 500 V DC for 1 minute to earth  |
| noise level                   | 69.9 dB conforming to 86/188/EEC  |
| power dissipation in W        | 3507 W (forced convection) at 380 V switching frequency 2.5 kHz<br>405 W (natural convection) at 380 V switching frequency 2.5 kHz  |
| vibration resistance          | 1 gn ( $f = 13...200$ Hz) conforming to IEC 60068-2-6<br>1.5 mm peak to peak ( $f = 2...13$ Hz) conforming to IEC 60068-2-6   |
| shock resistance              | 15 gn during 11 ms conforming to IEC 60068-2-27   |
| volume of cooling air         | 600 m <sup>3</sup> /h   |
| operating position            | Vertical +/- 10 degree  |
| THDI                          | $\leq 48$ % full load conforming to IEC 61000-3-12  |
| electromagnetic compatibility | 1.2/50 $\mu$ s - 8/20 $\mu$ s surge immunity test level 3 conforming to IEC 61000-4-5<br>Electrical fast transient/burst immunity test level 4 conforming to IEC 61000-4-4<br>Electrostatic discharge immunity test level 3 conforming to IEC 61000-4-2 |

|                                       |  |
|---------------------------------------|--|
|                                       | Radiated radio-frequency electromagnetic field immunity test level 3 conforming to IEC 61000-4-3<br>Conducted radio-frequency immunity test level 3 conforming to IEC 61000-4-6                        |
| pollution degree                      | 2 EN/IEC 61800-5-1   |
| environmental characteristic          | Chemical pollution resistance class 3C3 conforming to EN/IEC 60721-3-3<br>Dust pollution resistance class 3S3 conforming to EN/IEC 60721-3-3   |
| relative humidity                     | 5...95 % without condensation conforming to IEC 60068-2-3  |
| ambient air temperature for operation | 50...60 °C with derating factor<br>-15...50 °C without derating  |
| ambient air temperature for storage   | -40...70 °C  |
| operating altitude                    | <= 1000 m without derating<br>1000...4800 m with current derating 1 % per 100 m  |
| standards                             | EN/IEC 61800-3<br>UL 508C<br>EN/IEC 61800-5-1<br>IEC 61000-3-12<br>IEC 60721-3<br>IEC 61508<br>IEC 13849-1<br>EN/IEC 61800-3 (environment 1 category C2)<br>EN/IEC 61800-3 (environment 2 category C3) |
| product certifications                | CSA<br>TÜV<br>UL<br>REACH  |
| marking                               | CE   |

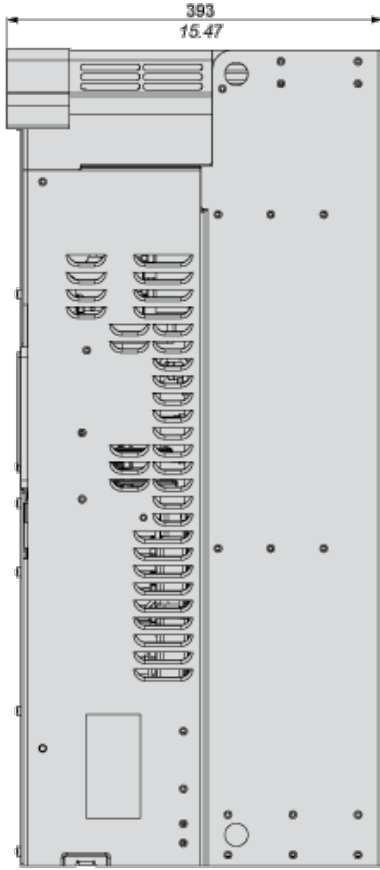
## Offer Sustainability

|                                  |   |
|----------------------------------|---|
| Sustainable offer status         | Green Premium product   |
| RoHS (date code: YYWW)           | Compliant - since 1526 - Schneider Electric declaration of conformity |
| REACH                            | Reference not containing SVHC above the threshold                     |
| Product environmental profile    | Available   |
| Product end of life instructions | Available   |

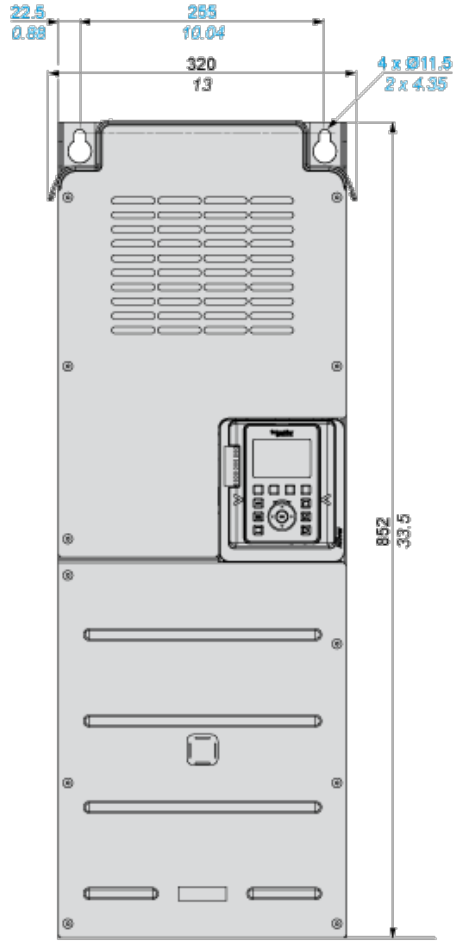
## Dimensions

Right and Front View

mm  
in.

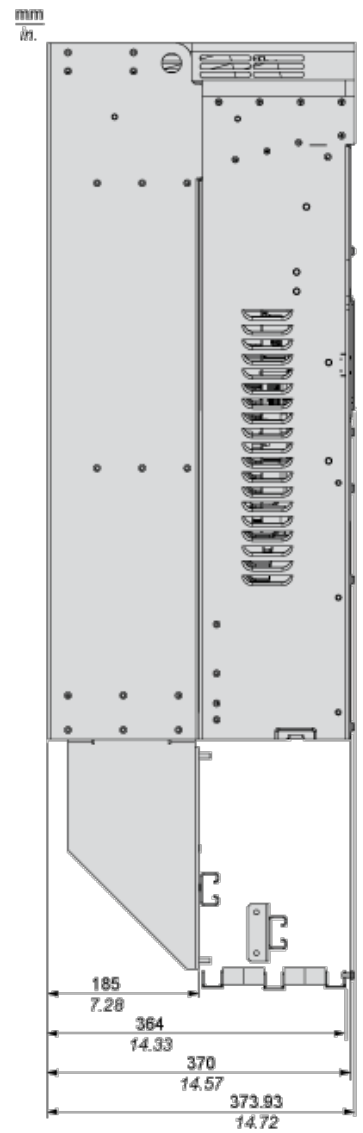
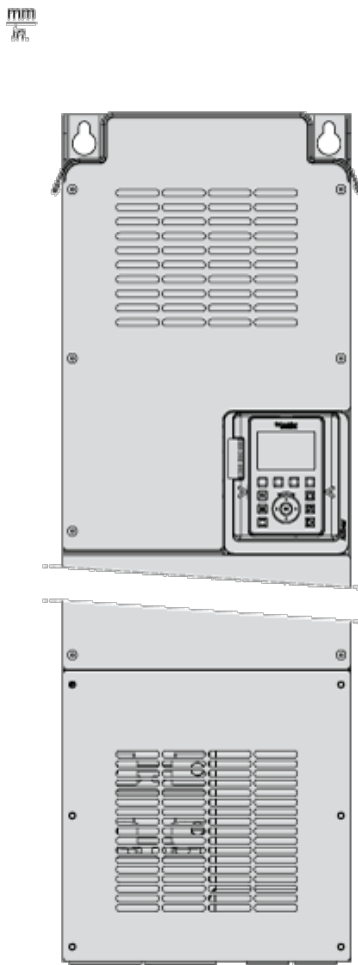
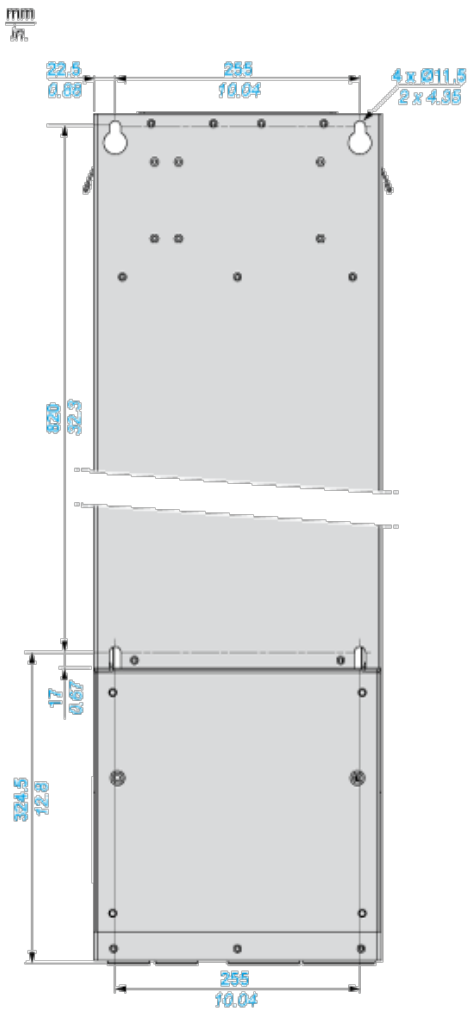


mm  
in.

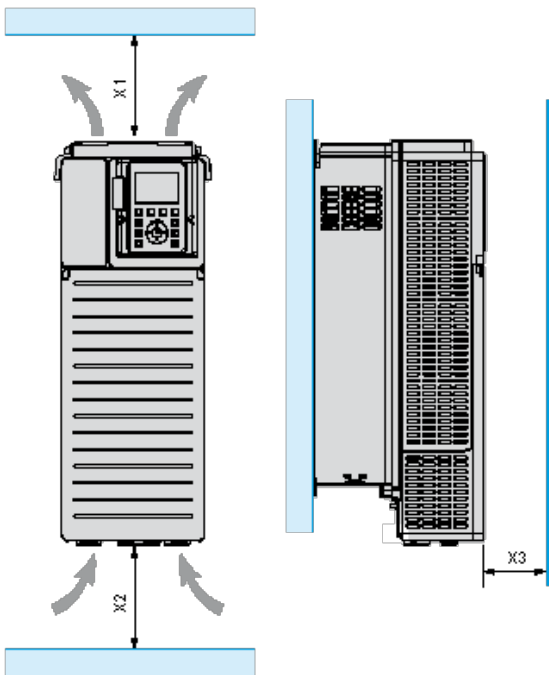


Drives with Lower Conduit Box Sold Separately

Rear, Front and Left View



## Clearances

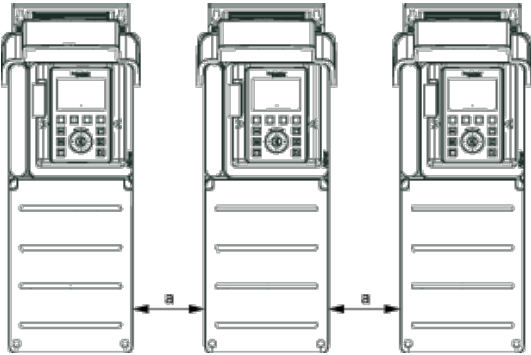


| X1                | X2                | X3                  |
|-------------------|-------------------|---------------------|
| ≥ 250 mm (10 in.) | ≥ 250 mm (10 in.) | ≥ 100 mm (3.94 in.) |

- | Mount the device in a vertical position ( $\pm 10^\circ$ ). This is required for cooling the device.
- | Do not mount the device close to heat sources.
- | Leave sufficient free space so that the air required for cooling purposes can circulate from the bottom to the top of the drive.

## Mounting Types

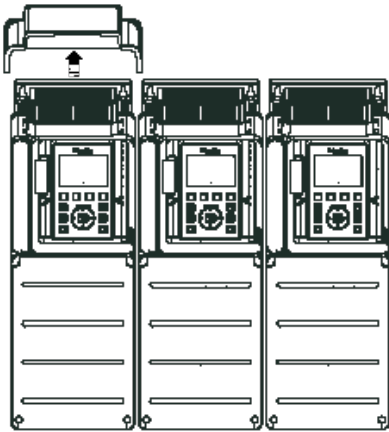
### Mounting Type A: Individual IP21



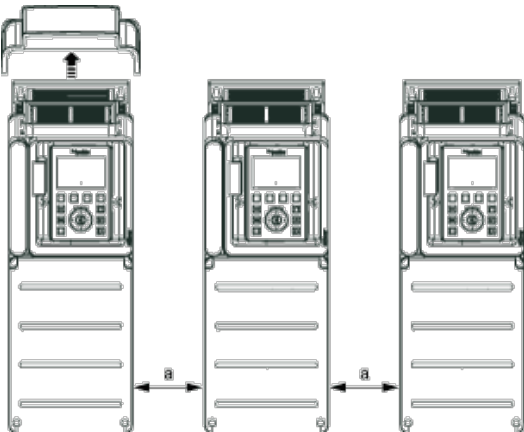
$a \geq 110 \text{ mm (4.33 in.)}$

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### Mounting Type B: Side by Side IP20 , Only possible at ambient temperature lower than 40 °C (104 °F)



### Mounting Type C: Individual IP20

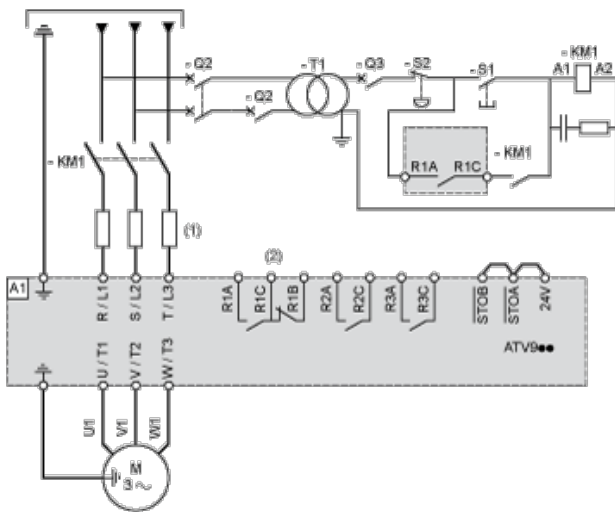


$a \geq 110 \text{ mm (4.33 in.)}$

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## Three-Phase Power Supply with Upstream Breaking via Line Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1



(1) Line choke if used

(2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.

A1 : Drive

KM1 :Line Contactor

Q2, Circuit breakers

Q3 :

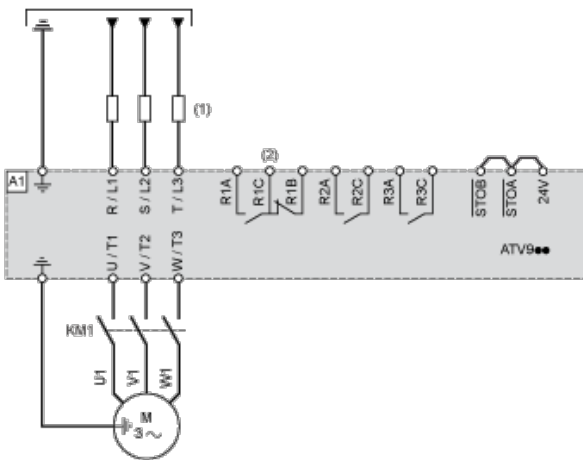
S1, Pushbuttons

S2 :

T1 : Transformer for control part

### Three-Phase Power Supply with Downstream Breaking via Contactor

Connection diagrams conforming to standards EN 954-1 category 1 and IEC/EN 61508 capacity SIL1, stopping category 0 in accordance with standard IEC/EN 60204-1



(1) Line choke if used

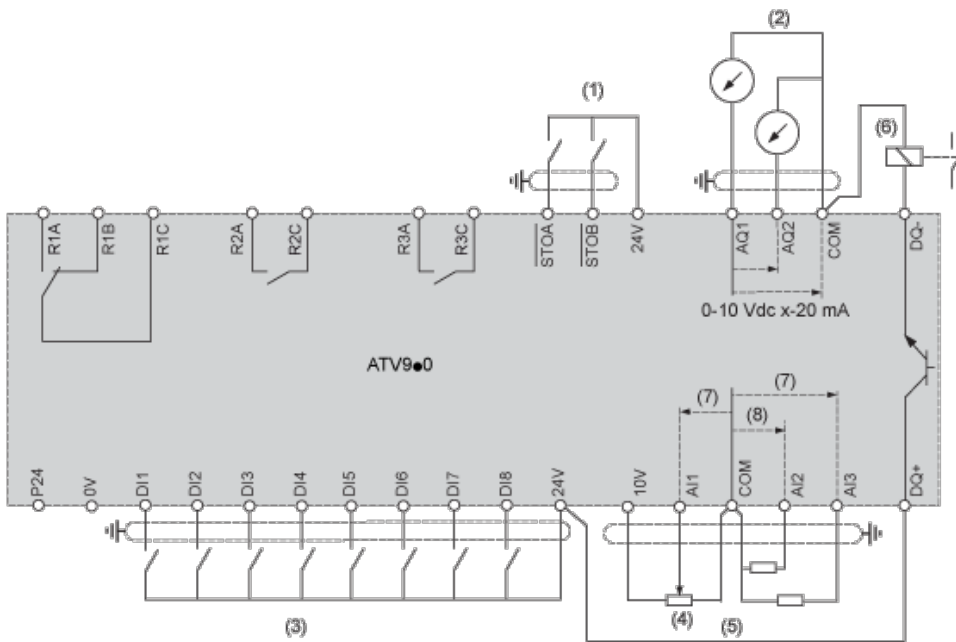
(2) Use relay R1 set to operating state Fault to switch Off the product once an error is detected.

A1 : Drive

KM1 :Contactor

### Control Block Wiring Diagram





- (1) Safe Torque Off
- (2) Analog Output
- (3) Digital Input
- (4) Reference potentiometer
- (5) Analog Input
- (6) Digital Output
- (7) 0-10 Vdc, x-20 mA
- (8) 0-10 Vdc, -10 Vdc...+10 Vdc

R1A, Fault relay

R1B,

R1C :

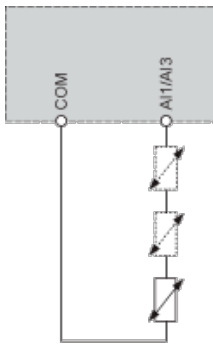
R2A, Sequence relay

R2C :

R3A, Sequence relay

R3C :

### Sensor Connection



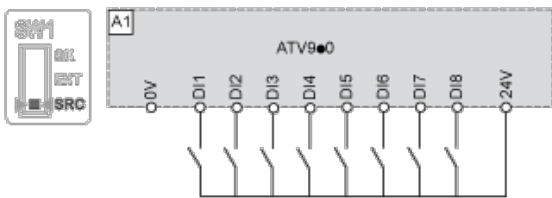
It is possible to connect either 1 or 3 sensors on terminals AI1 or AI3

### Sink / Source Switch Configuration

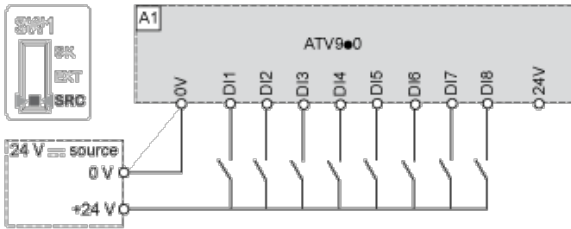
The switch is used to adapt the operation of the logic inputs to the technology of the programmable controller outputs.

- ▮ Set the switch to Source (factory setting) if using PLC outputs with PNP transistors.
- ▮ Set the switch to Ext if using PLC outputs with NPN transistors.

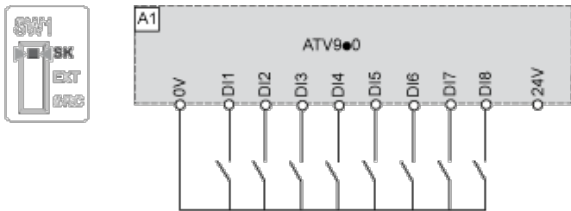
### Switch Set to SRC (Source) Position Using the Output Power Supply for the Digital Inputs



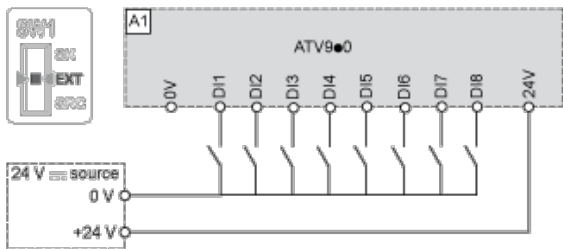
Switch Set to SRC (Source) Position and Use of an External Power Supply for the DIs



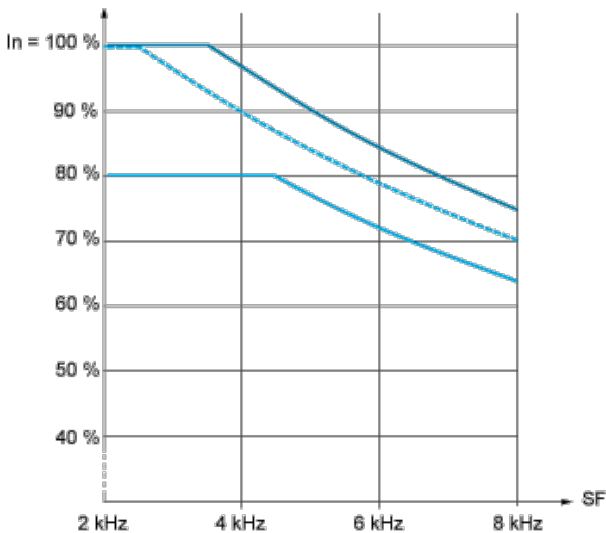
Switch Set to SK (Sink) Position Using the Output Power Supply for the Digital Inputs



Switch Set to EXT Position Using an External Power Supply for the DIs



### Derating Curves



- 40 °C (104 °F) - Mounting type A, B and C
- ⋯ 50 °C (122 °F) - Mounting type A and C
- 60 °C (140 °F) - Mounting type C

In : Nominal Drive Current  
 SF : Switching Frequency